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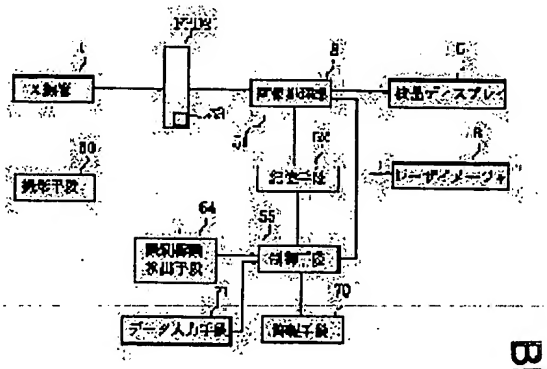
(54) METHOD FOR FORMING X-RAY IMAGE AND SYSTEM FOR FORMING X-RAY IMAGE

(57)Abstract:

PROBLEM TO BE SOLVED: To obtain an X-ray image by a continuous photographing being optimum for blood vessel contrasting and to obtain a good image with little influence of an afterimage when the continuous X-ray photographing is performed by using a flat panel detector and to improve ability of diagnosis.

SOLUTION: X-ray images are continuously taken and these continuously taken X-ray images are caught by means of a flat panel detector(FPD) 2 and the continuously taken X-ray images are taken out as image signals from the flat panel detector(FPD) 2. Afterimage errasing characteristic data of the flat panel detector (FPD) 2 are stored in advance and correction for eliminating afterimage parts of the data of the X-ray images is performed based on the afterimage errasing characteristic data.



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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] In case this invention performs a medical diagnosis, it is related with the X-ray picture formation approach and X-ray picture formation system which are used for roentgenography, such as angiography.
[0002]
[Description of the Prior Art] As an X-ray picture formation system used for roentgenography, such as angiography at the time of performing a medical diagnosis, an X-ray picture is captured to a flat panel detector, an X-ray picture is taken out from this flat panel detector as a picture signal, and there are some which form an X-ray picture.
[0003]
[Problem(s) to be Solved by the Invention] by the way, the X-ray picture formation system using such a flat panel detector (FPD) can obtain the X-ray picture which has very high sharp nature, and the check of a photography image is possible for it immediately after photography at CRT etc. -- etc. -- although it has the advantage, if the X-ray picture which carried out the seriography can be obtained, by angiography, a much more suitable medical diagnosis can be performed further.
[0004] When obtaining this X-ray picture that carried out the seriography, it is important to reduce S/N of the following image produced since sufficient time amount for elimination of residual charge cannot be taken compared with still picture photography, or for a fake image (arch FEKUTO) to be generated, and to make it not reduce diagnostic ability.
[0005] It was made in view of said actual condition, and the X-ray picture by the optimal seriography for angiography etc. can be obtained, when performing serioscopy using a flat panel detector moreover, a good image with little effect of an after-image is obtained, and this invention aims at offering the X-ray picture formation approach and X-ray picture formation system whose diagnostic ability improves.
[0006]
[Means for Solving the Problem] In order to solve said technical problem and to attain the purpose, this invention was constituted as follows.
[0007] the X-ray picture formation approach characterized by invention according to claim 1 taking out the X-ray picture which photoed "X-ray picture continuously, captured this X-ray picture that carried out the seriography to the flat panel detector, and carried out the seriography from this flat panel detector as a picture signal. " -- it is .
[0008] According to this invention according to claim 1, the X-ray picture by the optimal seriographies, such as angiography, can be obtained using a flat panel detector.
[0009] invention according to claim 2 -- " -- the X-ray picture formation approach according to claim 1 characterized by memorizing beforehand the after-image elimination property data of said flat panel detector, and performing amendment except the after-image part of the data of said X-ray picture based on the after-image elimination property data. " -- it is .
[0010] According to this invention according to claim 2, when performing serioscopy using a flat panel

detector, compared with still picture photography, sufficient time amount for elimination of residual charge cannot be taken, but by performing amendment except the after-image part of the data of an X-ray picture based on after-image elimination property data, a good image with little effect of an after-image is obtained, and diagnostic ability improves.

[0011] invention according to claim 3 -- " -- the X-ray picture formation approach according to claim 2 characterized by memorizing beforehand the after-image elimination property data for which it asked according to the flat panel detector to be used, choosing after-image elimination property data based on the distinguishing mark of the flat panel detector to be used, and performing amendment except the after-image part of the data of said X-ray picture. " -- it is .

[0012] According to this invention according to claim 3, by choosing after-image elimination property data based on the distinguishing mark of the flat panel detector to be used, according to the flat panel detector to be used, amendment except the after-image part of the data of an X-ray picture can be performed, a good image with more little effect of an after-image is obtained, and diagnostic ability improves.

[0013] invention according to claim 4 -- " -- the X-ray picture formation approach according to claim 1 to 3 characterized by said X-ray picture being an angiography image. " -- it is .

[0014] According to this invention according to claim 4, an X-ray picture is an angiography image and the condition of a blood vessel that blood flows etc. can be diagnosed more appropriately.

[0015] invention according to claim 5 -- " -- the X-ray picture formation approach according to claim 1 to 4 characterized by asking for said after-image elimination property data based on photography conditions according to a flat panel detector. " -- it is .

[0016] According to this invention according to claim 5, more positive amendment can be performed by asking for after-image elimination property data based on photography conditions according to a flat panel detector.

[0017] invention according to claim 6 -- " -- the X-ray picture formation approach according to claim 5 that said photography conditions are characterized by being the applied voltage at the time of photography, and/or an electrical-potential-difference impression pattern at the time of elimination. " -- it is .

[0018] According to this invention according to claim 6, photography conditions are the applied voltage at the time of photography, and/or an electrical-potential-difference impression pattern at the time of elimination, according to a photography part, a good image with little effect of an after-image is obtained, and diagnostic ability improves.

[0019] X-ray picture formation system characterized by equipping invention according to claim 7 with a photography means to photo said X-ray picture continuously, and an image-processing means to perform the image processing of the X-ray picture which is taken out from said flat panel detector as a picture signal, and which carried out the seriography, in the X-ray picture formation system which captures "X-ray picture to a flat panel detector, and takes out an X-ray picture from this flat panel detector as a picture signal. " -- it is .

[0020] According to this invention according to claim 7, the X-ray picture by the optimal seriography for angiography etc. can be obtained using a flat panel detector.

[0021] invention according to claim 8 -- " -- X-ray picture formation system according to claim 7 characterized by having the storage means which memorized beforehand the after-image elimination property data of said flat panel detector, and said image-processing means performing amendment except the after-image part of the data of said X-ray picture based on said after-image elimination property data. " -- it is .

[0022] According to this invention according to claim 8, when performing serioscopy using a flat panel detector, compared with still picture photography, sufficient time amount for elimination of residual charge cannot be taken, but by performing amendment except the after-image part of the data of an X-ray picture based on after-image elimination property data, a good image with little effect of an after-image is obtained, and diagnostic ability improves.

[0023] A storage means for invention according to claim 9 to make the after-image elimination property

data for which it asked according to the flat panel detector which "plurality uses correspond with the distinguishing mark of a flat panel detector beforehand, and to memorize, A distinguishing mark detection means to detect the distinguishing mark of the flat panel detector to be used, It has the control means which chooses the after-image elimination property data of the flat panel detector used based on the detected distinguishing mark. X-ray picture formation system of a publication of claim 7 characterized by performing amendment except the after-image part of the data of an X-ray picture based on selected after-image elimination property data, or claim 8. It is ".

[0024] According to this invention according to claim 9, by choosing after-image elimination property data based on the distinguishing mark of the flat panel detector to be used, according to the flat panel detector to be used, amendment except the after-image part of the data of an X-ray picture can be performed, a good image with more little effect of an after-image is obtained, and diagnostic ability improves.

[0025] invention according to claim 10 -- " -- X-ray picture formation system of a publication of claim 7 characterized by equipping said flat panel detector with a storage means to make the after-image elimination property data for which it asked according to the flat panel detector which plurality uses correspond with the distinguishing mark of a flat panel detector beforehand, and to memorize them, or claim 8. " -- it is .

[0026] According to this invention according to claim 10, according to the flat panel detector which reads and uses after-image elimination property data based on the distinguishing mark directly memorized by the storage means from the flat panel detector to be used, amendment except the after-image part of the data of an X-ray picture can be performed, a good image with more little effect of an after-image is obtained, and diagnostic ability improves.

[0027] invention according to claim 11 -- " -- X-ray picture formation system according to claim 7 to 10 characterized by having an alarm means to tell automatically the updating stage of said after-image elimination property data. " -- it is .

[0028] According to this invention according to claim 11, the updating stage of after-image elimination property data can be more correctly used as after-image elimination property data by getting to know automatically.

[0029] invention according to claim 12 -- " -- X-ray picture formation system according to claim 7 to 10 characterized by having the data input means which updates said after-image elimination property data. " -- it is .

[0030] According to this invention according to claim 12, after-image elimination property data are updated, it is made more after-image elimination property data at accuracy, a good image with little effect of an after-image is obtained, and diagnostic ability improves.

[0031] invention according to claim 13 -- " -- X-ray picture formation system according to claim 7 to 12 characterized by said X-ray picture being an angiography image. " -- it is .

[0032] According to this invention according to claim 13, an X-ray picture is an angiography image and the condition of a blood vessel that blood flows etc. can be diagnosed more appropriately.

[0033] invention according to claim 14 -- " -- X-ray picture formation system according to claim 7 to 13 characterized by asking for said after-image elimination property data based on photography conditions according to a flat panel detector. " -- it is .

[0034] According to this invention according to claim 14, more positive amendment can be performed by asking for after-image elimination property data based on photography conditions according to a flat panel detector.

[0035] invention according to claim 15 -- " -- X-ray picture formation system according to claim 14 by which said photography conditions are characterized by being the applied voltage at the time of photography, and/or an electrical-potential-difference impression pattern at the time of elimination. " -- it is .

[0036] According to this invention according to claim 15, photography conditions are the applied voltage at the time of photography, and/or an electrical-potential-difference impression pattern at the time of elimination, according to a photography part, a good image with little effect of an after-image is

obtained, and diagnostic ability improves.
[0037]
[Embodiment of the Invention] Although the gestalt of operation of the X-ray picture formation system of this invention is hereafter explained based on a drawing, this invention of be [it / what is limited to the gestalt of this operation] is clear.
[0038] The outline sectional view in which drawing 1 shows the outline block diagram of an X-ray picture formation system, and drawing 2 shows a flat panel detector (FPD), and drawing 3 are the outline top views showing a flat panel detector (FPD).
[0039] As shown in drawing 1 , an X-ray picture formation system photos a photographic subject 60 with the X-ray irradiated from X-ray tube 1, and captures an X-ray picture to the flat panel detector (FPD) 2. An X-ray picture is taken out from this flat panel detector (FPD) as a picture signal, an image processing is carried out in the image-processing section 3, and it sends to a network 4. The liquid crystal display 5 and the laser imager 6 grade are connected to the network 4, an X-ray picture is displayed on a liquid crystal display 5, or an X-ray picture is printed and outputted to it with the laser imager 6.
[0040] The flat panel detector (FPD) 2 is constituted as shown in drawing 2 and drawing 3 .
[0041] The laminating of the photoconduction layer 21, a dielectric layer 22, and the front conductive layer 23 is carried out at order, and the flat panel detector (FPD) 2 is constituted by the dielectric substrate layer 20, as shown in drawing 2 . On the dielectric substrate layer 20, two or more 1st minute electric conduction electrode microplates 24 are formed, and the profile which is the minimum pixel which can resolve the flat panel detector (FPD) 2 with the dimension of this 1st minute electric conduction electrode microplate 24 becomes settled. The electrostatic-capacity dielectric material 25 is applied on two or more 1st minute electric conduction electrode microplates 24.
[0042] Furthermore, on the dielectric substrate layer 20, the laminating of two or more transistors 29 which have two electrodes 26 and 27 and gates 28 is carried out. Furthermore, on the dielectric substrate layer 20, the laminating of two or more 2nd minute electric conduction electrode microplates 30 is carried out.
[0043] As shown in drawing 3 , at least one transistor 29 has connected two or more 2nd minute electric conduction electrode microplates 30 to the X address line 41 and the Y sense line 42. The charge storage capacitor 36 is formed of the 1st minute electric conduction electrode microplate 24, the 2nd minute electric conduction electrode microplate 30, and the electrostatic-capacity dielectric material 25. The 2nd minute electric conduction electrode microplate 30 is connected also to the electrode 27 of a transistor 29. The 1st minute electric conduction electrode microplate 24 is connected to the ground.
[0044] A transistor 29 commits a bidirectional switch and a current is passed between the Y sense line 42 and the charge storage capacitor 36 according to whether bias voltage was impressed to the gate through the X address line 41.
[0045] In the tooth space between two or more 2nd minute electric conduction electrode microplates 30, the electric conduction electrode or the X address line 41 and the electric conduction electrode, or the Y sense line 42 is arranged. The X address line 41 and the Y sense line 42 are arranged so that it may intersect perpendicularly mostly to mutual like illustration. The X address line 41 and the Y sense line 42 let lead wire or a connector pass, and are accessible according to the individual along with the side or edge of the flat panel detector (FPD) 2.
[0046] The address of each of the X address line 41 is carried out one by one by impressing bias voltage to the gate of the transistor 29 which was connected to the X address line 41 by which the address is carried out and which was carried out according to Rhine. Thereby, the charge which the transistor 29 would be in switch-on and was accumulated in the corresponding charge storage capacitor 36 flows to the input side of the charge detector 46 while flowing to the Y sense line 42. The charge detector 46 generates the voltage output proportional to the charge detected on the Y sense line 42. The picture signal with which the output of the charge detector 46 is sampled one by one, and charge distribution of the micro capacitor on the X address line 41 which carried out the address is expressed is acquired, and each micro capacitor expresses one image pixel. If a signal is read from Rhine with the pixel on the X

address line 41, a charge sensitive amplifier will be reset through the reset line 49. The address of the following X address line 41 is carried out, and all the charge storage capacitors 36 are sampled, and this process is repeated until the whole image is read.

[0047] Next, the X-ray picture of drawing 1 thru/or drawing 3 is captured to the flat panel detector (FPD) 2, and the X-ray picture formation system which takes out an X-ray picture from this flat panel detector (FPD) 2 as a picture signal photos an X-ray picture continuously like, as shown in drawing 4 and drawing 5 , it captures this X-ray picture that carried out the seriography to the flat panel detector (FPD) 2, and it is constituted so that the X-ray picture which carried out the seriography may be taken out from this flat panel detector (FPD) 2 as a picture signal.

[0048] The outline block diagram of the X-ray picture formation system which takes out the X-ray picture which carried out the seriography of drawing 4 as a picture signal, and drawing 5 are drawings showing an after-image elimination property.

[0049] In an X-ray picture formation system, it has a photography means 50 to photo an X-ray picture continuously, and an image-processing means 51 to perform the image processing of an X-ray picture by which the image-processing section 3 is taken out from the flat panel detector (FPD) 2 as a picture signal and which carried out the seriography is constituted, actuation of the photography means 50 can perform the seriography of multiple times in 1 second, and the X-ray picture by the optimal seriography for angiography etc. can be obtained using the flat panel detector (FPD) 2.

[0050] Moreover, it has the storage means 52 which memorized after-image elimination property data beforehand according to the flat panel detector (FPD) 2, and the image-processing means 51 performs amendment except the after-image part of the data of an X-ray picture based on after-image elimination property data.

[0051] As shown in drawing 5 , according to the flat panel detector (FPD) 2, it asks for after-image elimination property data based on photography conditions. In drawing 5 , after-image blanking time is taken along an axis of abscissa, after-image level is taken along an axis of ordinate, and when electrolysis reinforcement is large, the after-image elimination property A is searched for, and according to photography conditions, when electrolysis reinforcement is small, the after-image elimination property B is searched for.

[0052] As photography conditions, there are applied voltage for example, at the time of photography and/or an electrical-potential-difference impression pattern at the time of elimination, and more positive amendment can be performed by asking for after-image elimination property data based on photography conditions according to the flat panel detector (FPD) 2. Moreover, photography conditions are the applied voltage at the time of photography, and/or an electrical-potential-difference impression pattern at the time of elimination, according to a photography part, a good image with little effect of an after-image is obtained, and diagnostic ability improves.

[0053] Thus, the after-image elimination property peculiar to the flat panel detector (FPD) 2 is beforehand memorized according to photography conditions, using the after-image elimination property, after-image level is predicted per pixel, the pixel value which deducted and carried out the forecast of after-image level from each image by the seriography is memorized in the memory of the image-processing means 51, and it outputs to a liquid crystal display 5 or the laser imager 6. Although sufficient time amount for elimination of residual charge cannot be taken compared with still picture photography when performing serioscopy using the flat panel detector (FPD) 2, by performing amendment except the after-image part of the data of an X-ray picture based on after-image elimination property data, a good image with little effect of an after-image is obtained, and diagnostic ability improves.

[0054] Moreover, make the after-image elimination property data for which it asked according to the flat panel detector (FPD) 2 which plurality uses correspond to the storage means 52 with the distinguishing mark 53 of a rat panel detector beforehand, and it memorizes. A distinguishing mark detection means 54 to detect the distinguishing mark 53 of the flat panel detector (FPD) 2 to be used, It has the control means 55 which chooses the after-image elimination property data of the flat panel detector (FPD) 2 used based on the detected distinguishing mark 53, and amendment except the after-image part of the

data of an X-ray picture can be performed based on selected after-image elimination property data.
[0055] Thus, by choosing after-image elimination property data based on the distinguishing mark 53 of the flat panel detector (FPD) 2 to be used, according to the flat panel detector (FPD) 2 to be used, amendment except the after-image part of the data of an X-ray picture can be performed, a good image with more little effect of an after-image is obtained, and diagnostic ability improves.
[0056] Drawing 6 is the outline block diagram of the gestalt of other operations of the X-ray picture formation system which takes out the X-ray picture which carried out the seriography as a picture signal.

[0057] With the gestalt of this operation, the flat panel detector (FPD) 2 is equipped with a storage means 60 to make the after-image elimination property data for which it asked according to the flat panel detector (FPD) 2 which plurality uses correspond with the distinguishing mark of the rat panel detector (FPD) 2 beforehand, and to memorize them, and this after-image elimination property data is read with the reading means 61, and is sent to the image-processing means 51 by the control means 55.
[0058] Thus, according to the flat panel detector (FPD) 2 which reads and uses after-image elimination property data based on the distinguishing mark directly memorized by the storage means 60 from the flat panel detector (FPD) 2 to be used, the image-processing means 51 can perform amendment except the after-image part of the data of an X-ray picture, a good image with more little effect of an after-image is obtained, and diagnostic ability improves.
[0059] Moreover, with the gestalt of operation shown in drawing 4 thru/or drawing 6 , it can have an alarm means 70 to tell automatically the updating stage of after-image elimination property data, and can be more correctly made after-image elimination property data by getting to know automatically the updating stage of after-image elimination property data. Moreover, it has the data input means 71 which updates after-image elimination property data, and after-image elimination property data are updated, it is made more after-image elimination property data at accuracy, a good image with little effect of an after-image is obtained, and diagnostic ability improves.
[0060] After the image information obtained by this X-ray picture formation system modulates laser-beam reinforcement with a picture signal using the scanning laser aligner (called a laser imager as a general name) used as image output units of the medical diagnostic field, such as MR, CT, and RI, and exposes it to a conventional silver halide photosensitive material and heat developing silver halide sensitive material, it can obtain the hard copy of an image through a suitable development process.
[0061] This scanning laser aligner is gas laser, such as solid-state-laser;helium-Ne laser, such as ruby laser, an YAG laser, and glass laser, Ar ion laser, Kr ion rhe ZAZA, a CO2 laser, a CO laser, helium-Cd laser, N2 laser, and an excimer laser, as the laser light source. Semiconductor laser, such as InGaP laser, AlGaAs laser, GaAs laser, InGaAs laser, InAsP laser, CdSnP2 laser, GaSb laser, and GaN REREZA, chemical laser, and dye laser are raised.
[0062] The silver halide photosensitive material used by this invention applies the under-coating layer which gives an adhesive property to a base material for the transparent polymeric materials which are not colored [coloring of polyester, triacetic acid ASETO, polyethylenenaphthalate, a polycarbonate, poly norbornene system resin, etc., or], and macromolecule layers (sensitization layer), such as gelatin which distributed the silver halide particle to one side or both sides of a base material on it further, are painted.
[0063] When the sensitization layer which contains a silver halide particle etc. only in one side is painted, the gelatin layer which contains an antihalation coating, an antistatic agent, a mat agent, etc. if needed can be painted on another field of this layer. Poly membranes, such as gelatin of this layer, can adjust that thickness so that the curl with this sensitive material strong during environmental humidity or underwater processing may not be caused. It is used with this sensitive material and a sensitization layer distributes a silver halide particle. It is the presentation of this silver halide, a silver chloride, silver chlorobromide, etc., and a gestalt can choose the shape of a die, eight face piece, and its particle size distribution for the purpose from a narrow thing to a large thing. Mean particle diameter is converted as a spherical silver halide particle, and its 0.1-1 micrometer is desirable the shape of a potato, a globular shape, a cylinder, plate-like, etc. In a plate-like case, an average aspect ratio can use the thing of 100:1-

2:1. It is desirable to use the core / shell mold particle of the multiplex layer structure from which the halogen presentation of the interior of a silver halide particle and a front face differs.
[0064] the manufacture approach of this silver halide particle -- JP,59-177535,A and 59-17844 -- said -- it can refer to 60-35726, 60-147727, etc. carrying out chemical sensitization of these silver halide particles using a hypo, a selenium compound, a tellurium compound, and a gold compound -- desirable -- a silver halide particle generate time -- an iridium compound -- in addition to this -- a metal ion -- ****** -- sensitizing dye can be added. the spectrum of the sensitizing dye used for sensitive material -- maximum wave length is 500-1500nm, and, generally cyanine dye and merocyanine coloring matter use -- having -- the structure -- C.E.KMees, T.H.James work, and The theory of the photographic It is indicated by edition [3rd] Process and 198-201 pages (Macmillan, New York, 1986).
[0065] Moreover, it is desirable to contain the mel helmet compound containing the nitrogen-containing organic compound and sulfur atom of the versatility which controls the Capri rise under preservation in a sensitization layer and development. The color which furthermore prevents an irradiation in a sensitization layer can be contained. Moreover, the nonphotosensitivity silver halide particle for giving irregularity to the film surface after a development and suppressing reflection of outdoor daylight can be contained. The gelatin protective layer which protects a sensitization layer can be painted on the upper layer of a sensitization layer, and this layer can be made to contain an antistatic agent, a mat agent, a slide agent, etc. according to the purpose. And it is desirable to contain the dura mater material which constructs a bridge in a gelatin chain into a sensitization layer and its protective layer, and strengthens a film surface.
[0066] As for the silver halide sensitive material of this invention, it is desirable to carry out a development using an auto-processor, and the processing time (Dry to Dry) can be processed in 10 - 210 seconds. the developer used with an auto-processor -- as development **** -- JP,4-154641,A, dihydroxybenzene given in JP,4-16841,A and 3-pyrazolidone, and ASUKORUBEN -- it is desirable to use acids. A hydroxylation salt and a carbonate are used in bad second acid chloride as preservatives, and are used in JP,61-28708,A or a buffer given in JP,60-93439,A as alkali chemicals. A sulfide, and a JISURUFIRUDO compound and triazine are used as glycols and a silver sludge inhibitor as a resolvent.
[0067] As for an azole system organic inhibitor and an inorganic inhibitor, an organic inhibitor can use a compound L[, such as a potassium bromide,].F.A. Mason work "photographic processing chemistry" Focal Press Co. ** (1966) 226 - given in 229 page. Moreover, an organic chelating agent and a dialdehyde system development hardening agent can be included. The amount of supplements of the developer when carrying out a development has one desirable 5-15ml / quarter. As a fixer, the fixing material generally used can be included in this industry, and a chelating agent, a fixing hardening agent, and a fixing accelerator can be included.
[0068] The silver halide sensitive material which performs heat developing, without performing the above wet processings given in JP,9-311407,A can be used. This sensitive material has at least one-layer sensitization layer on a base material, and organic silver salt and photosensitivity are the heat developing sensitive material containing the reducing agent and binder for a silver halide particle and complex ion. Mean particle diameter is converted as a globular form particle by the shape of a cube, eight face pieces, a globular shape, and a potato by there being a presentation of the silver halide particle of this sensitive material with iodine silver bromide, a silver bromide, silver chlorobromide, or a silver bromide, and 0.2-0.10 micrometers is desirable. Furthermore, it is desirable to use the spectral sensitization coloring matter which gives chemical sensitization to a silver halide particle with a hypo, a selenium, and a gold compound, and gives color sensitivity to 400-1500nm.
[0069] In order to control the rise of fogging under preservation of sensitive material in this sensitive material, it is desirable to contain organic carboxylate and an isocyanate compound. The long-chain carboxylic-acid silver salt of 10-30 has [the organic silver salt used for sensitive material] a desirable carbon number. They are behenic acid silver, stearin acid silver, silver oleate, silver laurate, KANORON ****, myristic-acid silver, PAL thymine ****, maleic-acid silver, fumaric-acid silver, silver tartarate, silver linoleate, silver butyrate, silver camphorate, and this mixture as that example.
[0070] As for the reducing agent for organic silver salt, dihydroxybenzene, such as phenidone and

hydroquinone, is used. In addition, a wide range reducing agent can be used, for example, it is the combination of amide oximes, azines, aliphatic-carboxylic-acid aryl hydronalium azide, and an ascorbic acid etc. Moreover, it is desirable to paint a protective coat on the sensitization layer of sensitive material, and it can add [for the purpose of an antistatic agent, a mat agent, a slide agent, etc.] to this protective coat.

[0071] These sensitization layer and a protective layer paint the transparent polymeric materials which are not colored [coloring of the polyester which applied lower ****** which gives an adhesive property, triacetic acid ASETO, polyethylenenaphthalate, poly car PONETO, poly norbornene system resin, etc., or] on a base material. It is desirable to apply the backing layer containing an antihalation color, or a mat agent and an antistatic agent on the base material which has not applied the sensitization layer. A picture signal is exposed using a scanning laser aligner, and, as for sensitive material, heat developing is performed below 80 degrees C or more 200 degrees C.

[0072] The image information obtained by this X-ray picture formation system can obtain hard copy from the imprint layer which has a development component by imprinting in an acceptance layer by exposing by the high density laser beam with a picture signal using a scan laser aligner as indicated by JP,8-282099,A.

[0073] As for this scanning laser aligner, semiconductor laser, such as gas laser, such as solid state laser, such as ruby laser, an YAG laser, and glass laser, helium-Ne laser, Ar ion laser, Kr ion laser, a CO2 laser, a CO laser, helium-Cd laser, N2 laser, and an excimer laser, InGaP laser, AlGaAs laser, GaAs laser, InGaAs laser, InAsP laser, CdSnP2 laser, GaSb laser, and GaN laser, chemical laser, and dye laser are raised as the laser light source. Laser light is 400-1200nm.

[0074] Sensitive material consists of three base materials. By preparing the imprint ingredient which prepared the development component on the 1st base material, and an exfoliation ingredient with the 3rd base material so that an imprint layer may be met, and exposing high density energy light in images from a 1st base material side Reduce the base material of an exposure part, and the bonding strength of an imprint layer by ablation, and an imprint ingredient and an exfoliation ingredient are pulled apart. After imprinting the exposure section of an imprint layer on an exfoliation ingredient, it is characterized by forming a superposition image the imprint layer [of the exposure section of an exfoliation ingredient], and acceptance layer side of an acceptance ingredient with the acceptance layer which contains a coloring component on the 2nd base material. With the ablation said here, destruction of the imprint layer of an image exposure part is not started, but or only the bonding strength between a base material and an imprint layer declines, it is lost or it is included to a phenomenon until a crack arises in the imprint layer of an image exposure part else of a part of imprint layer of an image exposure part carrying out a thermal runaway, and emitting etc.

[0075] As for image formation, it is desirable for it to be carried out by mixing a coloring component and a development component after the time of latent-image formation or latent-image formation, and to heat or pressurize further. A means to heat may put a pressure for it at the same time that on which only whenever [opening, thermal head, heat roll, hot-stamping, and heat-stylus isothermal] is bet also applies temperature. The development component of the 1st layer is a silver source which colors the coloring component of the 2nd base material with an organic reducing agent for example, in an organic reducing agent. As for an organic reducing agent, a succinimide, a phthalimide, 2-methyl succinimide, a dithio uracil, 5-methyl-5-n-pentyl HIDATOIN, a phthalimide, etc. are raised. As a silver source, it is silver salt (for example, they are behenic acid silver, stearin acid silver, silver oleate, silver laurate, etc.) with aliphatic carboxylic acid.

[0076] Moreover, the **** thermal recording approach given in JP,9-188073,A can be used. The color in a color layer is made for the interface of facing each other, a color layer, and an acceptance layer to shift to an acceptance layer by giving the heat energy according to image information with heating impression means, such as a thermal head, so that the color stratification plane of a hot printing sheet and the acceptance stratification plane of a hot printing television sheet may touch. Furthermore, after shifting, an unreacted color is established by giving predetermined heat energy with heating impression means, such as a thermal head, from the tooth-back side of a hot printing sheet.

[0077] The example of the color of the heat translatability of a color layer can raise what is indicated by the open official report of JP,59-78893,A, 59-10909394, and 60-2398. The example of representation of the binder resin used for a color layer can be chosen from a cellulose system, a polyacrylic acid system, a polyvinyl alcohol system, etc. The resin with which a sublimation color tends to be established is chosen, for example, an acceptance layer can be chosen from polyolefin resin, polyvinyl chloride resin, polyvinylidene chloride resin, etc.
[0078] Furthermore, it is possible to output an image by the so-called ink jet which injects an ink particle in images based on the picture signal to input, and forms an image according to a piezoelectric effect etc., a picture signal can be further transposed to a lightwave signal, and an image can be outputted by the so-called digital KOPIA which is one of the xerographies which form the image by the toner.
[0079]
[Effect of the Invention] As described above, in invention according to claim 1, the X-ray picture by the optimal seriographies, such as angiography, can be obtained using a flat panel detector.
[0080] Although sufficient time amount for elimination of residual charge cannot be taken in invention according to claim 2 compared with still picture photography when performing serioscopy using a flat panel detector, by performing amendment except the after-image part of the data of an X-ray picture based on after-image elimination property data, a good image with little effect of an after-image is obtained, and diagnostic ability improves.
[0081] By invention according to claim 3, by choosing after-image elimination property data based on the distinguishing mark of the flat panel detector to be used, according to the flat panel detector to be used, amendment except the after-image part of the data of an X-ray picture can be performed, a good image with more little effect of an after-image is obtained, and diagnostic ability improves.
[0082] In invention according to claim 4, an X-ray picture is an angiography image and the condition of a blood vessel that blood flows etc. can be diagnosed more appropriately.
[0083] Invention according to claim 5 can perform more positive amendment by asking for after-image elimination property data based on photography conditions according to a flat panel detector.
[0084] In invention according to claim 6, photography conditions are the applied voltage at the time of photography, and/or an electrical-potential-difference impression pattern at the time of elimination, according to a photography part, a good image with little effect of an after-image is obtained, and diagnostic ability improves.
[0085] In invention according to claim 7, the X-ray picture by the optimal seriography for angiography etc. can be obtained in an X-ray picture formation system using a flat panel detector.
[0086] Although sufficient time amount for elimination of residual charge cannot be taken in invention according to claim 8 compared with still picture photography when it has the storage means which memorized beforehand the after-image elimination property data of a flat panel detector and performs serioscopy using a flat panel detector, by performing amendment except the after-image part of the data of an X-ray picture based on after-image elimination property data, a good image with little effect of an after-image is obtained, and diagnostic ability improves.
[0087] It has a storage means to make the after-image elimination property data for which it asked in invention according to claim 9 according to the flat panel detector which plurality uses correspond with the distinguishing mark of a rat panel detector beforehand, and to memorize them. By choosing the after-image elimination property data of the flat panel detector used based on the detected distinguishing mark According to the flat panel detector to be used, amendment except the after-image part of the data of an X-ray picture can be performed, a good image with more little effect of an after-image is obtained, and diagnostic ability improves.
[0088] In invention according to claim 10, according to the flat panel detector which reads and uses after-image elimination property data based on the distinguishing mark directly memorized by the storage means from the flat panel detector to be used, amendment except the after-image part of the data of an X-ray picture can be performed, a good image with more little effect of an after-image is obtained, and diagnostic ability improves.

[0089] By invention according to claim 11, the updating stage of after-image elimination property data can be more correctly used as after-image elimination property data by getting to know automatically.
[0090] In invention according to claim 12, after-image elimination property data are updated, it is made more after-image elimination property data at accuracy, a good image with little effect of an after-image is obtained, and diagnostic ability improves.
[0091] In invention according to claim 13, in an X-ray picture formation system, an X-ray picture is an angiography image and the condition of a blood vessel that blood flows etc. can be diagnosed more appropriately.
[0092] Invention according to claim 14 can perform more positive amendment in an X-ray picture formation system by asking for after-image elimination property data based on photography conditions according to a flat panel detector.
[0093] In invention according to claim 15, in an X-ray picture formation system, photography conditions are the applied voltage at the time of photography, and/or an electrical-potential-difference impression pattern at the time of elimination, according to a photography part, a good image with little effect of an after-image is obtained, and diagnostic ability improves.

[Translation done.]

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CLAIMS

[Claim(s)]
[Claim 1] The X-ray picture formation approach characterized by taking out the X-ray picture which photoed the X-ray picture continuously, captured this X-ray picture that carried out the seriography to the flat panel detector, and carried out the seriography from this flat panel detector as a picture signal.
[Claim 2] The X-ray picture formation approach according to claim 1 characterized by memorizing beforehand the after-image elimination property data of said flat panel detector, and performing amendment except the after-image part of the data of said X-ray picture based on the after-image elimination property data.
[Claim 3] The X-ray picture formation approach according to claim 2 characterized by memorizing beforehand the after-image elimination property data for which it asked according to the flat panel detector to be used, choosing after-image elimination property data based on the distinguishing mark of the flat panel detector to be used, and performing amendment except the after-image part of the data of said X-ray picture.
[Claim 4] The X-ray picture formation approach according to claim 1 to 3 characterized by said X-ray picture being an angiography image.
[Claim 5] Said after-image elimination property data are the X-ray picture formation approach according to claim 1 to 4 characterized by asking based on photography conditions according to a flat panel detector.
[Claim 6] The X-ray picture formation approach according to claim 5 that said photography conditions are characterized by being the applied voltage at the time of photography, and/or an electrical-potential-difference impression pattern at the time of elimination.
[Claim 7] The X-ray picture formation system characterized by having a photography means to photo said X-ray picture continuously, and an image-processing means to perform the image processing of the X-ray picture which is taken out from said flat panel detector as a picture signal, and which carried out the seriography, in the X-ray picture formation system which captures an X-ray picture to a flat panel detector, and takes out an X-ray picture from this flat panel detector as a picture signal.
[Claim 8] Said image-processing means is an X-ray picture formation system according to claim 7 characterized by performing amendment having the storage means which memorized beforehand the after-image elimination property data of said flat panel detector, and excluding the after-image part of the data of said X-ray picture based on said after-image elimination property data.
[Claim 9] A storage means to make the after-image elimination property data for which it asked according to the flat panel detector which plurality uses correspond with the distinguishing mark of a flat panel detector beforehand, and to memorize them, A distinguishing mark detection means to detect the distinguishing mark of the flat panel detector to be used, It has the control means which chooses the after-image elimination property data of the flat panel detector used based on the detected distinguishing mark. The X-ray picture formation system of a publication of claim 7 characterized by performing amendment except the after-image part of the data of an X-ray picture based on selected after-image elimination property data, or claim 8.

[Claim 10] The X-ray picture formation system of a publication of claim 7 characterized by equipping said flat panel detector with a storage means to make the after-image elimination property data for which it asked according to the flat panel detector which plurality uses correspond with the distinguishing mark of a flat panel detector beforehand, and to memorize them, or claim 8.
[Claim 11] The X-ray picture formation system according to claim 7 to 10 characterized by having an alarm means to tell automatically the updating stage of said after-image elimination property data.
[Claim 12] The X-ray picture formation system according to claim 7 to 10 characterized by having the data input means which updates said after-image elimination property data.
[Claim 13] The X-ray picture formation system according to claim 7 to 12 characterized by said X-ray picture being an angiography image.
[Claim 14] Said after-image elimination property data are an X-ray picture formation system according to claim 7 to 13 characterized by asking based on photography conditions according to a flat panel detector.
[Claim 15] The X-ray picture formation system according to claim 14 by which said photography conditions are characterized by being the applied voltage at the time of photography, and/or an electrical-potential-difference impression pattern at the time of elimination.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the outline block diagram of an X-ray picture formation system.
[Drawing 2] It is the outline sectional view showing a flat panel detector (FPD).
[Drawing 3] It is the outline top view showing a flat panel detector (FPD).
[Drawing 4] It is the outline block diagram of the X-ray picture formation system which takes out the X-ray picture which carried out the seriography as a picture signal.
[Drawing 5] It is drawing showing an after-image elimination property.
[Drawing 6] It is the outline block diagram of the gestalt of other operations of the X-ray picture formation system which takes out the X-ray picture which carried out the seriography as a picture signal.

[Description of Notations]
1 X-ray Tube
2 Flat Panel Detector
3 Image-Processing Section
4 Network
5 Liquid Crystal Display
6 Laser Imager
50 Photography Means
51 Image-Processing Means
52 Storage Means

[Translation done.]

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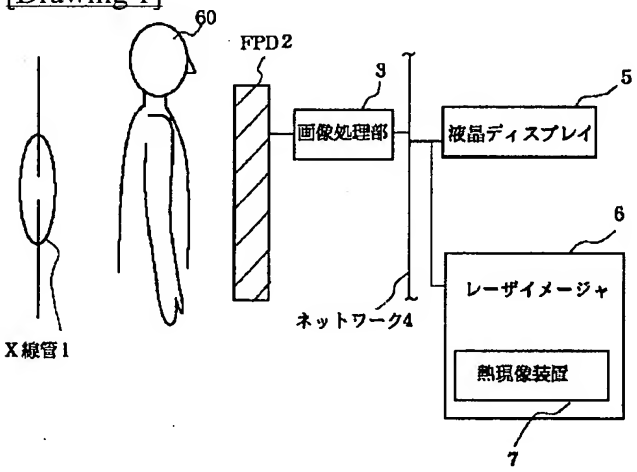
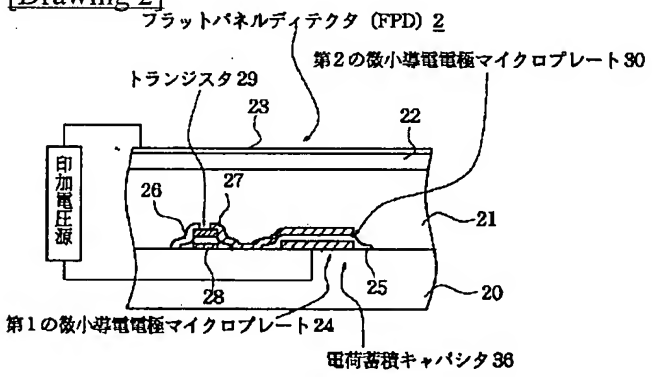
DRAWINGS

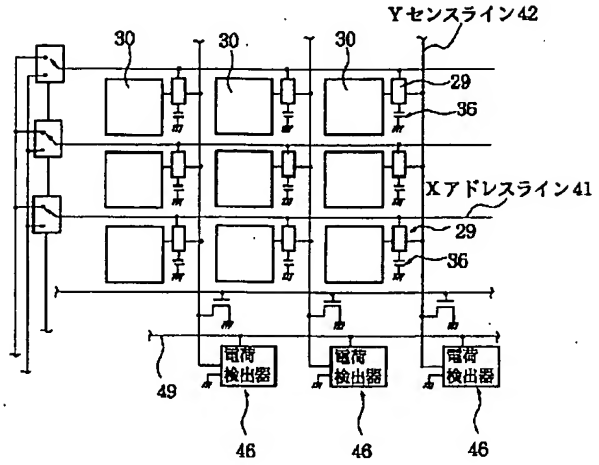
[Drawing 1]



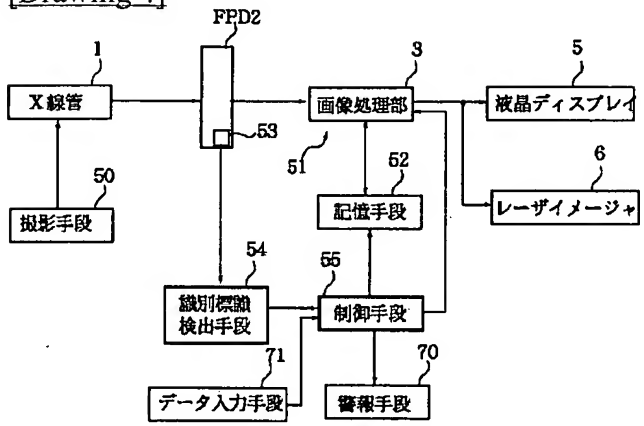
[Drawing 2]



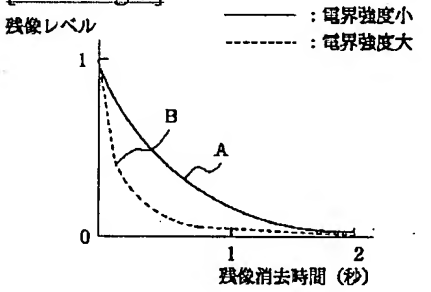
[Drawing 3]



[Drawing 4]



[Drawing 5]



[Drawing 6]